

REMARKS

At the outset, Applicant thanks the Examiner for the thorough review and consideration of the subject application. The Office Action of February 4, 2005 has been received and its contents carefully reviewed.

The drawings have been amended as follows: Figure 5A has been reverted back to its original form as originally filed on November 13, 2000.

Claim 1 is hereby amended. Accordingly, claims 1-13 are pending in the current application.

In the Office Action, the Examiner objected to the amendment filed November 22, 2004 under 35 U.S.C. § 132 because it allegedly introduces new matter. Applicant respectfully disagrees. However, and solely for the purpose of expediting prosecution, Applicant hereby amends Figure 5A and claim 1 to cancel the objected-to subject matter and requests withdrawal of the present objection.

In the Office Action, the Examiner rejected claims 1-13 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement because the phrase “a side portion of the photoresist pattern being exposed between the substrate and the second metal” is allegedly new matter. As discussed above, Applicant hereby cancels the “new matter” and requests withdrawal of the present rejection under 35 U.S.C. § 112, first paragraph.

In the Office Action, the Examiner rejected claims 1, 2, and 11 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Yamazaki et al. (U.S. Patent No. 5,247,191) in combination with Shigeta et al. (U.S. Patent No. 6,480,253) and Havemann et al. (U.S. Patent No. 5,891,804). This rejection is respectfully traversed and reconsideration is requested.

As set forth at M.P.E.P. § 2143.01, the fact that references can be combined or modified is not sufficient to establish a *prima facie* case of obviousness. Moreover, the mere fact that references relied upon teach that all aspects of the claimed invention were individually known is insufficient to establish a *prima facie* case of obviousness. Rather, a *prima facie* case of obviousness is established when, among other elements, there is some objective reason, either in

the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings in a manner that arrives at the claimed invention.

Nevertheless, the Examiner rejects claims 1 asserting that Yamazaki et al. teaches, with respect to Figure 7A, “forming a photoresist pattern P1 on the substrate; etching a portion of the substrate to form a groove 101 beneath a top surface of the substrate using the photoresist pattern P1 as a mask; depositing a [second] metal 102 on the substrate, a height of the second metal being smaller than a depth of the groove; [and] removing the photoresist pattern on the substrate and the second metal on the photoresist other than in the groove....” The Examiner acknowledges that Yamazaki et al. does not disclose “preparing a mixed solution having a reductant and a first metal for forming the first metal on the second metal in the groove by submerging the substrate in the mixed solution.” Attempting to cure this deficiency, the Examiner relies upon Havemann et al. as disclosing “forming a photoresist pattern 46 on a substrate 42/40; etching a portion of the substrate to form a groove 74 beneath a top surface of the ... substrate, ... and a height of the second metal being smaller than a depth of the groove, fig. 3b; removing the photoresist pattern on the substrate and the second metal on the photoresist other than in the groove, fig. 3c; and forming the first metal 52 ... on the second metal in the groove ... by electroless plating.” Concluding, the Examiner asserts that it would have been obvious “to apply the method steps of Havemann in the method of Yamazaki et al. ... as those formation steps would have been selected to improve further the filling trench in accordance with the thin film conductor as taught by Yamazaki et al. ...” Applicant respectfully disagrees.

For example, Figure 7A of Yamazaki et al. appears to show wherein the height of the “second metal” 102 is less than the depth of the groove 101. Nevertheless, the groove 101 also appears to be completely filled because the surface of the second metal 102 is oxidized by an anodic oxidation process (see Yamazaki et al., column 6, lines 1-5). Referring to Figures 3a to 3g of Havemann et al., while the height of the “second metal” 50 is less than the depth of the groove 47, the groove 47 is incompletely filled, necessitating the subsequent depositions of the “first metal” 52 and the top encapsulation 54 (see Havemann et al., column 4, line 34 – column 5, line 18). Because the groove 101 of Yamazaki et al. is completely filled upon forming and oxidizing the “second metal” 102, Applicant respectfully submits one of ordinary skill in the art would not form the “first metal” 54 of Havemann et al. on the “second metal” 102 of Yamazaki

et al. in an attempt to “improve further the filing [of the groove 101]” as apparently asserted by the Examiner. Shigeta et al. fails to cure the deficiency in the combination of Yamazaki et al. and Havemann et al. at least with respect to this element as recited in claim 1. For at least this reason, Applicant respectfully requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

Moreover, Applicant respectfully submits that the inventive concepts disclosed in Havemann et al. (i.e., selective deposition including at least partial electroless deposition of “first metal” 50)are directed to avoid “void problems incurred in the PVD filling of high aspect ratio vias (height to width ratios of greater than 1)” (see column 1, lines 39-43; column 4, lines 43-55). However, the groove 101 of Yamazaki et al. has a depth of 2 μm and a width of 30 μm (aspect ratio of about 0.07) (see column 5, lines 67-68). Because the aspect ratio of the groove 101 of Yamazaki et al. is only about seven percent of the aspect ratio of the grooves to which the inventive concepts of Havemann et al. are directed, Applicant respectfully submits that one of ordinary skill in the art would not turn to the teachings of Havemann et al. in an attempt to “improve further the filing [of the groove 101]” as apparently asserted by the Examiner. Shigeta et al. fails to cure the deficiency in the combination of Yamazaki et al. and Havemann et al. at least with respect to this element as recited in claim 1. For at least this additional reason, Applicant respectfully requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

In view of the above, Applicant respectfully submit that the Examiner has failed to identify any objective reason for modifying the combination of Yamazaki et al. and Shigeta et al. using Havemann et al. Absent any objective rationale, Applicant submits that the only teaching or suggestion to modify any combination of Yamazaki et al. and Shigeta et al. using Havemann et al. is based upon Applicant’s disclosure and claims. Accordingly, it is respectfully submitted that the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al. arrives at the presently claimed invention only with the benefit impermissible hindsight reasoning. For at least this additional reason, Applicant respectfully requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

Claims 2 and 11 depend from claim 1 and, therefore, include all of the elements recited in claim 1. As established above, the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al. fails to render claim 1 *prima facie* obvious. Therefore, Applicant respectfully

submits that the Examiner has failed to establish that claims 2 and 11 are *prima facie* obvious in view of the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al.

In the Office Action, the Examiner rejected claims 4, 5, 7, 8, and 10 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Yamazaki et al. in combination with Shigeta et al. and Havemann et al., as applied to claims 1 and 2, and further in view of Senda et al. (U.S. Patent No. 5,364,459). This rejection is respectfully traversed and reconsideration is requested.

Preliminarily, Applicant respectfully submits that claim 4 depends from claim 3, claim 7 depends from claim 6, and claim 10 depends from claim 9. Therefore, claims 4, 7, and 10 include the respective elements recited in claims 3, 6, and 9. The subject matter of claims 3, 6, and 9, however, was not addressed in the rejection involving the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al. Because the obviousness of claims 3, 6, and 9 has not been addressed in light of the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al., Applicant respectfully request withdrawal of the present rejection of claims 4, 7, and 10 under 35 U.S.C. § 103(a).

Nevertheless, claims 4, 5, 7, 8, and 10 depend from claim 1 and, therefore, include all of the elements recited in claim 1. As established above, the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al. fails to render claim 1 *prima facie* obvious. Moreover, Senda et al. fails to cure the deficiency in the combination of Yamazaki et al., Shigeta et al., and Havemann et al. as applied to claim 1. Therefore, Applicant respectfully submits that the Examiner has failed to establish that claims 4, 5, 7, 8, and 10 are *prima facie* obvious in view of the applied combination of Yamazaki et al., Shigeta et al., Havemann et al., and Senda et al.

In the Office Action, the Examiner rejected claims 3, 6, and 9 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Yamazaki et al. in combination with Shigeta et al., Havemann et al., and Senda et al., as applied to claims 1 and 2, and further in view of Charneski et al. (U.S. Patent No. 6,284,652) and/or Eriksson et al. (U.S. Patent No. 3,632,435). This rejection is respectfully traversed and reconsideration is requested.

Claims 3, 6, and 9 depend from claim 1 and, therefore, include all of the elements recited in claim 1. As established above, the applied combination of Yamazaki et al., Shigeta et al., and

Havemann et al. fails to render claim 1 *prima facie* obvious. Moreover, neither Charneski et al. nor Eriksson et al., singly or in combination, cures the deficiency in the combination of Yamazaki et al., Shigeta et al., and Havemann et al. as applied to claim 1. Therefore, Applicant respectfully submits that the Examiner has failed to establish that claims 3, 6, and 9 are *prima facie* obvious in view of the applied combination of Yamazaki et al., Shigeta et al., Havemann et al., Senda et al., and Charneski et al., and/or Eriksson et al.

In the Office Action, the Examiner rejected claims 12 and 13 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Yamazaki et al. in combination with Shigeta et al., Havemann et al., and Senda et al., as applied to claim 1, and further in view of Ichikawa et al. (JP Patent Pub. No. 05-265040) and the related art shown in Figures 1 to 2e. This rejection is respectfully traversed and reconsideration is requested.

Preliminarily, claims 12 and 13 depend from claim 1 and, therefore, include all of the elements recited in claim 1. As established above, the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al. fails to render claim 1 *prima facie* obvious. Moreover, neither Ichikawa et al. nor the related art shown in Figures 1 to 2e cures the deficiency in the combination of Yamazaki et al., Shigeta et al., and Havemann et al. as applied to claim 1. Therefore, Applicant respectfully submits that the Examiner has failed to establish that claims 12 and 13 are *prima facie* obvious in view of the applied combination of Yamazaki et al., Shigeta et al., and Havemann et al., Ichikawa et al. and the related art shown in Figures 1 to 2e.

Moreover, Applicant respectfully submits that claim 12 depends directly from claim 1. Therefore, claims 12 and 13 include the respective elements recited in claim 1. Senda et al., however, was not applied in any combination with respect to any of the elements recited in claim 1. If the Examiner intends to apply Senda et al. against any of the elements of claim 1, Applicant respectfully requests withdrawal of the present rejection under 35 U.S.C. § 103(a) as the Examiner has failed to identify any of the elements recited in claim 1 that are allegedly taught or suggested by Senda et al. and has failed to explain how/why one of ordinary skill in the art would use Senda et al. to modify the previously discussed combination of Yamazaki et al., Shigeta et al., and Havemann et al. as applied to claim 1.

Even if Senda et al. could be used to modify the combination of Yamazaki et al., Shigeta et al., and Havemann et al., as applied to claim 1, and even if Ichikawa et al. and the related art shown in Figures 1 to 2e disclose what they are alleged to disclose, Applicant respectfully submits the Examiner has provided no objective reason to modify the combination of Yamazaki et al., Shigeta et al., Havemann et al., and Senda et al. Specifically, the Examiner concludes the rejection of claims 12 and 13, asserting it would have been obvious to “apply the gate electrode of Senda et al. using the method of Havemann et al./Yamazaki et al./Shigeta et al. combination into of making a trench gate line and the applicant’s ... [related art] of forming transistor as the method and the analogous electrode would be selected in accordance with ... [Ichikawa et al.] and the ... [related art].” Applicant respectfully submits, however, that such a statement is simply conclusive and does not indicate how or why one of ordinary skill in the art would modify the combination of any of the aforementioned references, as actually or allegedly applied against claim 1, and arrive at the elements recited in claims 12 and 13. Absent any objective rationale, Applicant submits that the only teaching or suggestion to modify the aforementioned combination of references is based upon Applicant’s disclosure and claims. Accordingly, it is respectfully submitted that the present combination of references, in addition to Ichikawa et al. and the related art shown in Figures 1 to 2e, arrives at the presently claimed invention only with the benefit impermissible hindsight reasoning. For at least this additional reason, Applicant respectfully requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

Applicants believe the foregoing amendments place the application in condition for allowance and early, favorable action is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

Application No.: 09/709,483
Amdt. dated April 8, 2005
Reply to Final Office Action dated February 4, 2005

Docket No.: 8733.307.00-US

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. § 1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Dated: April 8, 2005

Respectfully submitted,

By


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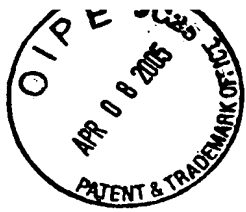
Attorney for Applicant

Attachments

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to Figure 5A. This sheet, which includes Figures 5A, 5B, 6A, and 6B, replaces the previously submitted Annotated sheet which includes Figures 5A, 5B, 6A, and 6B. Figure 5A has been amended to revert back to its original form as filed on November 13, 2000.

Attachment: Replacement Sheet
 Annotated sheet showing changes



App No.: 09/709,483

Docket No.: 8733.307.00-US

Inventor: Oh-Nam Kwon

Title: METHOD OF MANUFACTURING A THIN FILM TRANSISTOR
ANNOTATED SHEET

1 OF 1

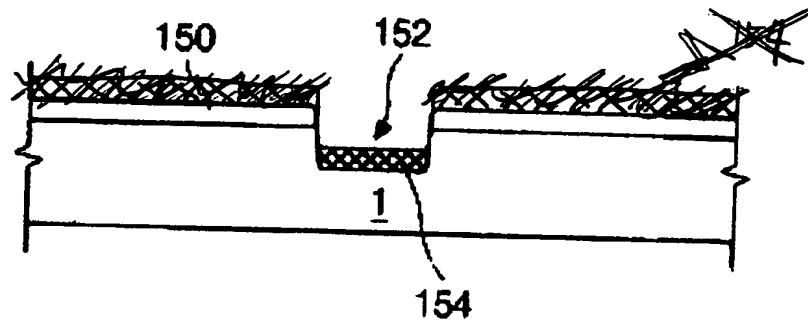


Fig 5A